



OSWER Innovations Pilot

Biomass Energy Conversion (BECON) Study

The Office of Solid Waste and Emergency Response (OSWER) Assistant Administrator Marianne Horinko in December 2001 initiated a series of innovative pilots to test new ideas and strategies for environmental and public health protection to make OSWER programs more efficient, effective, and user-friendly. A small amount of money is set aside to fund creative proposals submitted by OSWER Headquarters and Regional employees. EPA employees are encouraged to talk to States, Tribes, local governments, and external stakeholders about proposal ideas and partner on a project. The creative projects test approaches to waste minimization, energy recovery, recycling, and land revitalization that may be replicated across various sectors, industries, communities, and regions. We hope these pilots will pave the way for programmatic and policy recommendations by demonstrating the environmental and economic benefits of creative, innovative approaches to the difficult environmental challenges we face today.

BACKGROUND

Currently, fuels and many chemicals and materials are produced from petroleum. This project offers the potential to produce those same products from a renewable resource - farm crops and farm wastes. The Biomass Energy Conversion (BECON) facility is a multi-million dollar investment by the State of Iowa to advance producing value-added products from farm crops and wastes and transferring that knowledge to industry. It is associated with the Iowa State University in Ames, Iowa. BECON will use plant materials that are traditionally considered grain processing wastes – oat hulls, corn stover, wheat straw and similar material (called lignocellulose). Through a series of industrial processes, they want to turn the lignocellulose into industrial chemicals. These industrial chemicals can readily be turned into fibers (such as plastics or nylon) or other important chemicals (such as antifreeze). Plant-based “green” plastics potentially can provide a large and lucrative market for the farm economy while providing the opportunity to reduce both toxic and municipal waste.

PILOT APPROACH

BECON, with funding from the U.S. EPA Region 7, will investigate the feasibility of establishing new, bio-based plastic manufacturing processes. BECON

already is producing several types of chemicals, fuels, and materials. BECON believes technology transfer to industry mandates that they must demonstrate a complete system to carry a product from the farm field to the consumer. These “field to shelf” demonstrations require a thorough understanding of product production and become the basis for meaningful discussion with industry. The pilot will obtain the expertise necessary to delineate plastic production processes, identify and develop cost estimates for equipment, define operational control strategies, and establish cost estimates for operating pilot-scale equipment that can be used to produce polymers (such as polyethylene and polypropylene). Completion of the study will position BECON to seek additional resources to construct one or more pilot-scale polymer production units. These pilot-scale polymer production units will allow BECON to engage in active technology transfer to industry.

INNOVATION

The capacity to create fundamental “building blocks” from underutilized waste streams provides an opportunity to reduce both toxic and municipal wastes. The Pilot will demonstrate a new method for combining environmental protection with economic stimulation. A significant improvement in rural economic health achieved through the creation of green

products will increase the value of wastes and agricultural land while expanding the cash flow with which rural communities can address environmental issues. A change from a petroleum-based economy to a locally derived plant-based economy would represent a huge innovation.

BENEFITS

Most plastics currently are produced from petrochemicals. These processes produce significant quantities of toxic or hazardous byproducts. To the extent that these plastics can be displaced by products made from cleaner, biological sources, the wastes associated with current plastic production can be minimized. Another waste minimization dimension to this pilot is that municipal solid waste streams contain significant amounts of paper, food wastes, scrap wood, yard wastes, etc. (biological materials). These waste streams are potential feedstocks for creating plastics. By diverting biological wastes from the municipal solid waste stream, these materials become valuable products with productive reuse. In addition, the potential jobs created by new industries that use local agricultural residues to produce hundreds of products would make a very positive difference.

CONTACTS

Wes Bartley, U.S. EPA Region 7, 913-551-7632

Norm Olson, BECON, 515-382-1774

For additional information, visit the EPA OSWER Innovations web site at: www.epa.gov/oswer/IWG.htm.

Also you can learn about BECON's facility and their resource conservation and energy production capacity on the Internet at: www.energy.iastate.edu



BECON's research facility (foreground) has the same potential using farm products as the refinery illustrated in the background.



Sample farm wastes – inputs to the BECON processes.

BECON's physical plant includes operations like this biodiesel plant -- as well as pyrolysis, fermentation, gasification and other unit operations.

